What is claimed is:

1. A method for suppression of interfering co-channel signals, synchronous or asynchronous, in a single antenna interference cancellation (SAIC) receiver (10) by calculating a desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$), comprising the steps of:

receiving (60) a radio signal (11) by a receiver filter (12) of the SAIC receiver (10) and providing a filtered waveform signal (y) to a joint channel estimator (40) of a joint channel estimator module (24) of the SAIC receiver (10);

providing (65) a desired bit decision signal ($\hat{\mathbf{a}}(1)$) to the joint channel estimator module (24); and

computing (72) the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$) by the joint channel estimator (40) using the filtered waveform signal (y), the desired bit decision signal ($\hat{\mathbf{a}}(1)$) and an interfering training sequence signal (37) and an interfering training sequence delay signal (38) generated without prior knowledge of a training sequence of the interfering co-channel signals.

2. The method of claim 1, after the step of providing (65) the desired bit decision signal ($\hat{\mathbf{a}}(1)$) to the joint channel estimator module (24), further comprising the steps of:

computing (64) a replica signal (32) calculated by a replica signal generation means (30) of the joint channel estimator module (24) as a convolution of the desired bit decision signal $\hat{\mathbf{a}}(1)$ and a replica impulse response $\mathbf{h}_r$ of said replica signal generation means (30); and

generating (66) a residual signal ($\hat{\mathbf{i}}$) by subtracting the replica signal (32) from the filtered waveform signal y using an adder (44).

3. The method of claim 2, wherein the interfering training sequence (37) and the interfering training sequence delay signal (38) are identified by calculating correlating signals of said residual signal ($\hat{\mathbf{i}}$) with the candidate training sequences or training sequences convolved by a known transmission pulse shape for all possible bit positions; among said correlating signals, the maximum correlation signal is selected

as interfering training sequence (37) and the corresponding timing position as the interfering training sequence delay signal (38) which are provided to the joint channel estimator (40).

4. The method of claim 1, wherein the interfering signals are asynchronous with a desired signal.

5. The method of claim 1, wherein the interfering signals are synchronous with a desired signal.

6. The method of claim 1, wherein the desired bit decision signal ($\hat{\mathbf{a}}(1)$) consists partly of a known training bit sequence signal.

7. The method of claim 1, after receiving (60) the radio signal by the receiver filter (12), further comprising the steps of:

computing (62) an initial desired impulse response estimate signal ($\hat{\mathbf{h}}_{CM}$) using the filtered waveform signal (y) by a channel estimator (22) of a first stage (14) of the SAIC receiver (10); and

computing (64) the desired bit decision signal ($\hat{\mathbf{a}}(1)$) using the initial desired impulse response estimate signal ($\hat{\mathbf{h}}_{CM}$) and the filtered waveform signal (y) by a single antenna interference cancellation (SAIC) detector (20) of the first stage (14) of the SAIC receiver (10).

8. The method of claim 7, wherein the channel estimator (22) is an iterative constant modulus (CM) channel estimator and SAIC detector (20) is a constant modulus single antenna interference cancellation (CM-SAIC) detector.

9. The method of claim 1, after the step of computing (72) the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$) by the joint channel estimator (24), further comprising the step of:

computing (74) a further desired bit decision signal ($\hat{\mathbf{a}}(2)$) using the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$) and the filtered waveform signal (**y**) by a further SAIC detector (20a) of a second stage (16) of the SAIC receiver (10).

10. The method of claim 9, wherein the further desired bit decision signal ($\hat{\mathbf{a}}(2)$) is an output signal of the SAIC receiver (10) based on a predetermined criterion.

11. The method of claim 9, further comprising the step of:

providing (78) the further desired bit decision signal ($\hat{\mathbf{a}}(2)$) to a further joint channel estimator module (24a) of a third stage (18) of the SAIC receiver (10).

12. The method of claim 9, wherein the channel estimator (22) is an iterative constant modulus (CM) channel estimator and wherein the SAIC detector (20) and the further SAIC detector (20a) are constant modulus single antenna interference cancellation (CM-SAIC) detectors.

13. A single antenna interference cancellation (SAIC) receiver (10) for suppression of interfering co-channel signals, both synchronous or asynchronous, by calculating a desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$), comprising:

a receiver filter (12) of the SAIC receiver (10), responsive to a radio signal (11), for providing a filtered waveform signal (**y**);

a means (14) for providing a desired bit decision signal ($\hat{\mathbf{a}}(1)$); and

a joint channel estimator (24) of the SAIC receiver (10), responsive to the filtered waveform signal (**y**), to the desired bit decision signal ($\hat{\mathbf{a}}(1)$) and to an interfering training sequence signal (37) and an interfering training sequence delay signal (38) generated without prior knowledge of training sequence of the interfering co-channel signal, for providing the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$).

14. The SAIC receiver (10) of claim 13, wherein the means for providing a desired bit decision signal ($\hat{\mathbf{a}}(1)$) is a first stage (14) of the SAIC receiver (10), said first stage (14) comprises:

a channel estimator (22), responsive to the filtered waveform signal ($\mathbf{y}$), for providing an initial desired impulse response estimate signal ($\hat{\mathbf{h}}_{CM}$); and

a single antenna interference cancellation (SAIC) detector (20), responsive to the initial desired impulse response estimate signal ($\hat{\mathbf{h}}_{CM}$), for providing the desired bit decision signal ($\hat{\mathbf{a}}(1)$).

15. The SAIC receiver (10) of claim 13, wherein the channel estimator (22) is an iterative constant modulus (CM) channel estimator and SAIC detector (20) is a constant modulus single antenna interference cancellation (CM-SAIC) detector.

16. The SAIC receiver (10) of claim 13, further comprising at least one more stage (16), responsive to the desired bit decision signal ($\hat{\mathbf{a}}(1)$) and to the filtered waveform signal $\mathbf{y}$, for providing a further desired bit decision signal ($\hat{\mathbf{a}}(2)$).

17. The SAIC receiver (10) of claim 16, wherein the further desired bit decision signal ($\hat{\mathbf{a}}(2)$) is an output signal of a further SAIC detector (20a) based on a predetermined criterion.

18. The SAIC receiver (10) of claim 16, wherein said at least one more stage that is a second stage (16) comprises:

a further SAIC detector (20a), responsive to the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$), for providing the further desired bit decision signal ($\hat{\mathbf{a}}(2)$); and

a joint channel estimator module (24), responsive to the desired bit decision signal ($\hat{\mathbf{a}}(1)$) and to the filtered waveform signal ($\mathbf{y}$), for providing the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$).

19. The method of claim 18, wherein the channel estimator (22) is an iterative constant modulus (CM) channel estimator and wherein the SAIC detector (20) and the further SAIC detector (20a) are constant modulus single antenna interference cancellation (CM-SAIC) detectors.

20. The SAIC receiver (10) of claim 18, wherein said joint channel estimator module (24) comprises:

a replica signal generation means (30), responsive to the desired bit decision signal ($\hat{\mathbf{a}}(1)$), for providing a replica signal (32) calculated by said replica signal generation means (30) as a convolution of the desired bit decision signal $\hat{\mathbf{a}}(1)$ and a replica impulse response $\mathbf{h}_r$ of said replica signal generation means (30);

an adder (44), for providing a residual signal $\hat{\mathbf{i}}$ by subtracting the replica signal (32) from the filtered waveform signal (**y**);

a correlation means, responsive to the residual signal ($\hat{\mathbf{i}}$), for providing the interfering training sequence (37) and its delay signal (38) identified by calculating correlating signals of said residual signal ($\hat{\mathbf{i}}$) with the candidate training sequences or training sequences convolved by a known transmission pulse shape for all possible bit positions; among said correlating signals, the maximum correlation signal is selected as the interfering training sequence signal (37) and the corresponding timing position as the interfering training sequence delay signal (38) which are provided to the joint channel estimator (40); and

a joint channel estimator (40), responsive to the filtered waveform signal (**y**), to the desired bit decision signal $\hat{\mathbf{a}}(1)$, to the interfering training sequence signal (37) and to the interfering training sequence delay signal (38), for providing the desired impulse response estimate signal ($\hat{\mathbf{h}}_{JCE}^{(1)}$).

21. The SAIC receiver (10) of claim 16, further comprising at least one further stage (18), responsive to the further desired bit decision signal ($\hat{\mathbf{a}}(2)$) and to the filtered waveform signal (**y**), for providing at least one further desired bit decision signal ($\hat{\mathbf{a}}(3)$).